# Western North American Natural Gas Supply

August 13, 2002

**Washington State Energy Strategy Advisory Committee**
**Seattle, Washington**

**Tim L. Stauft**

**www.purvingertz.com**

# Objective of the Presentation

**“To present Purvin & Gertz’ latest views in terms of interregional gas flows with a particular focus on the future supply potential in Western North America.”**

# Outline of the Presentation

- Introduction to Purvin & Gertz Inc.
- The Big Picture
- Inter-regional Gas Flows
- Supply Forecast
- Summary and Conclusions

# Purvin & Gertz, Inc Overview….

- Employee - owned consulting firm, founded in 1947
- Independent of any holding company, engineering firm or process licensor
- Consultants are chemical engineers, MBA's, economists with significant experience in client industries
- Provides sound and objective strategic, commercial, and technical advice to the international energy industry
- Specializes in serving clients involved in the exploration, production, processing, transportation, distribution, and marketing of natural gas, gas liquids, crude oil, and petroleum production as well as provide services to the petrochemical and electricity industries

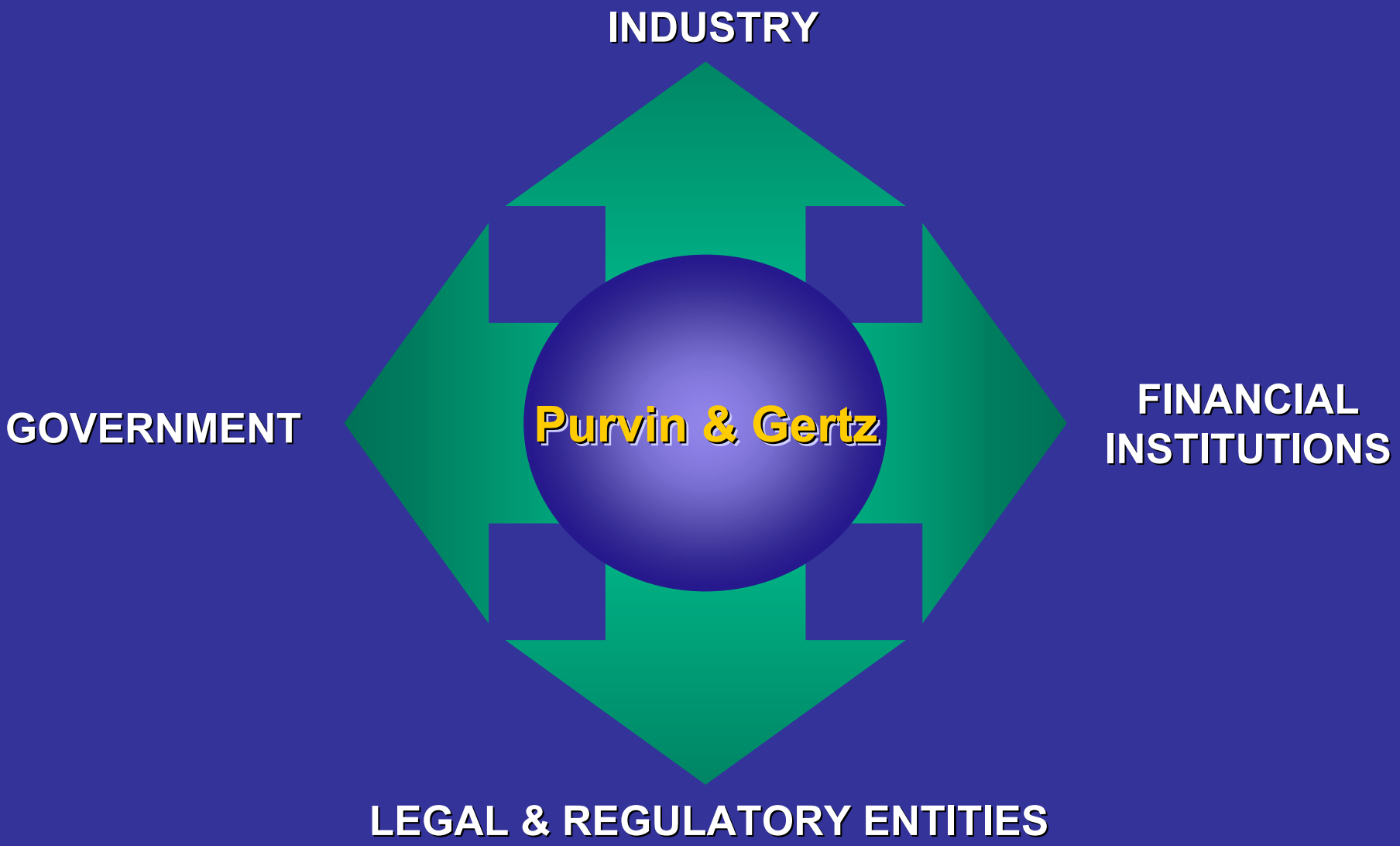
# A Global Network to Serve Clients Worldwide …

# Our Consulting Practice…

**To provide strategic advice and project development support to the international energy industry**

- Experience
- Independence & Objectivity
- Global Network of Offices
- Databases and Methodologies

# Serving A Wide Range of Clients . . .



# About Purvin & Gertz -- Industries Served

- Natural Gas -- Markets and Infrastructure
- NGL -- Processing and Marketing
- Crude Oil -- Supply and Pricing
- Petroleum Products -- Refining and Marketing
- Petrochemicals -- Alliance with CMAI
- Electricity -- Alliance with Sargent & Lundy

**80 % single client work**

# Subscription-Based Studies and Reports (20%) …

## Industry Studies

- Alaskan Gas Development Strategies (2000)
- North American NGL Industry (2000)
- MTBE Phaseout (2000)
- Mackenzie Delta/Beaufort Sea Gas Development (1999)
- Deepwater Gulf of Mexico Gas Study (1998)
- Canadian Heavy Crude Oil Markets (1998)

## Market Services

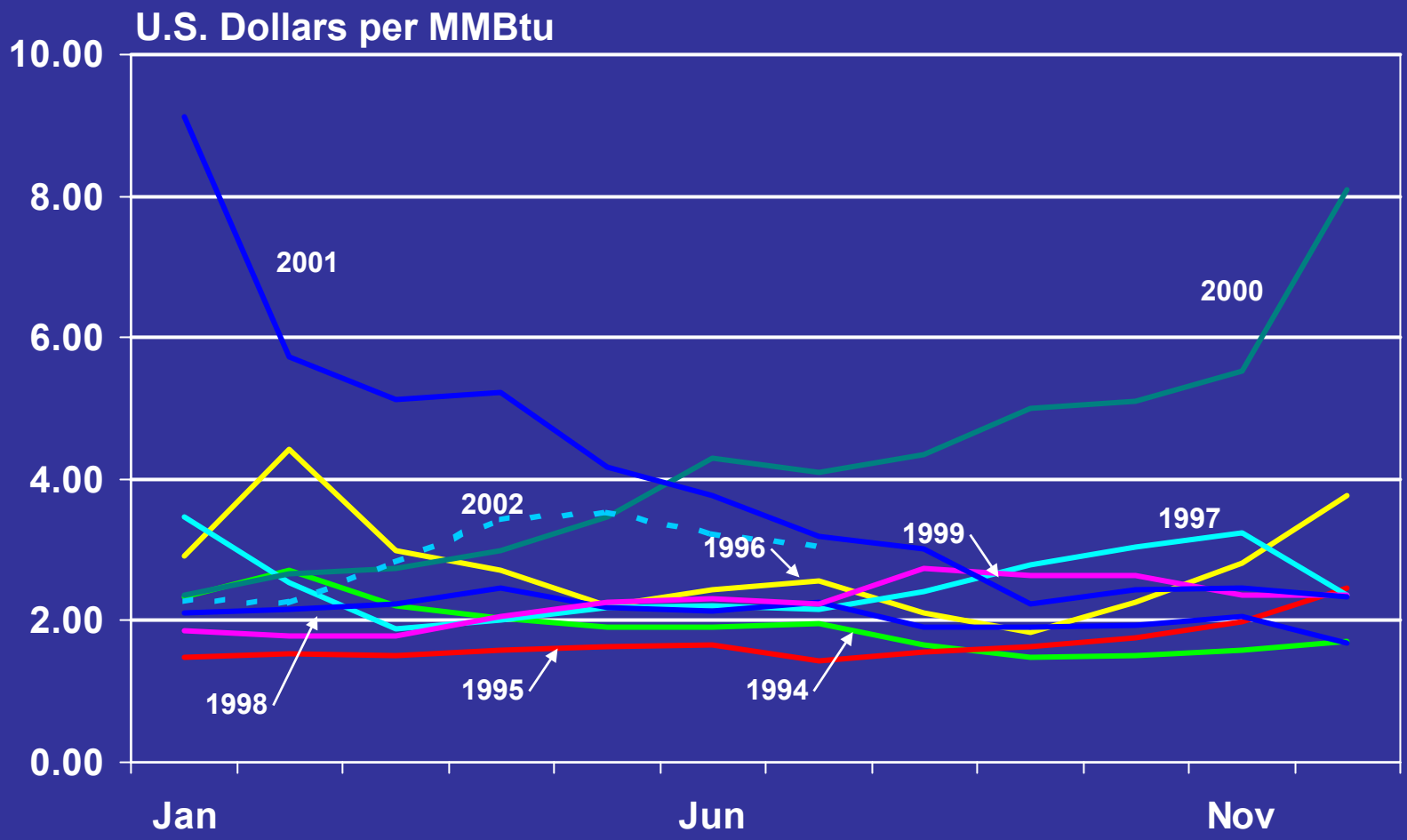
- LPG & Gas Market Outlook
- Oil & Gas Outlook: Canadian Edition
- Global Petroleum Market Outlook (online service)
- Crude Oil & Refining Outlook: Western Hemisphere Edition Canadian/U.S. Midwest Edition
- European Refining & Market Outlook

## Online Products

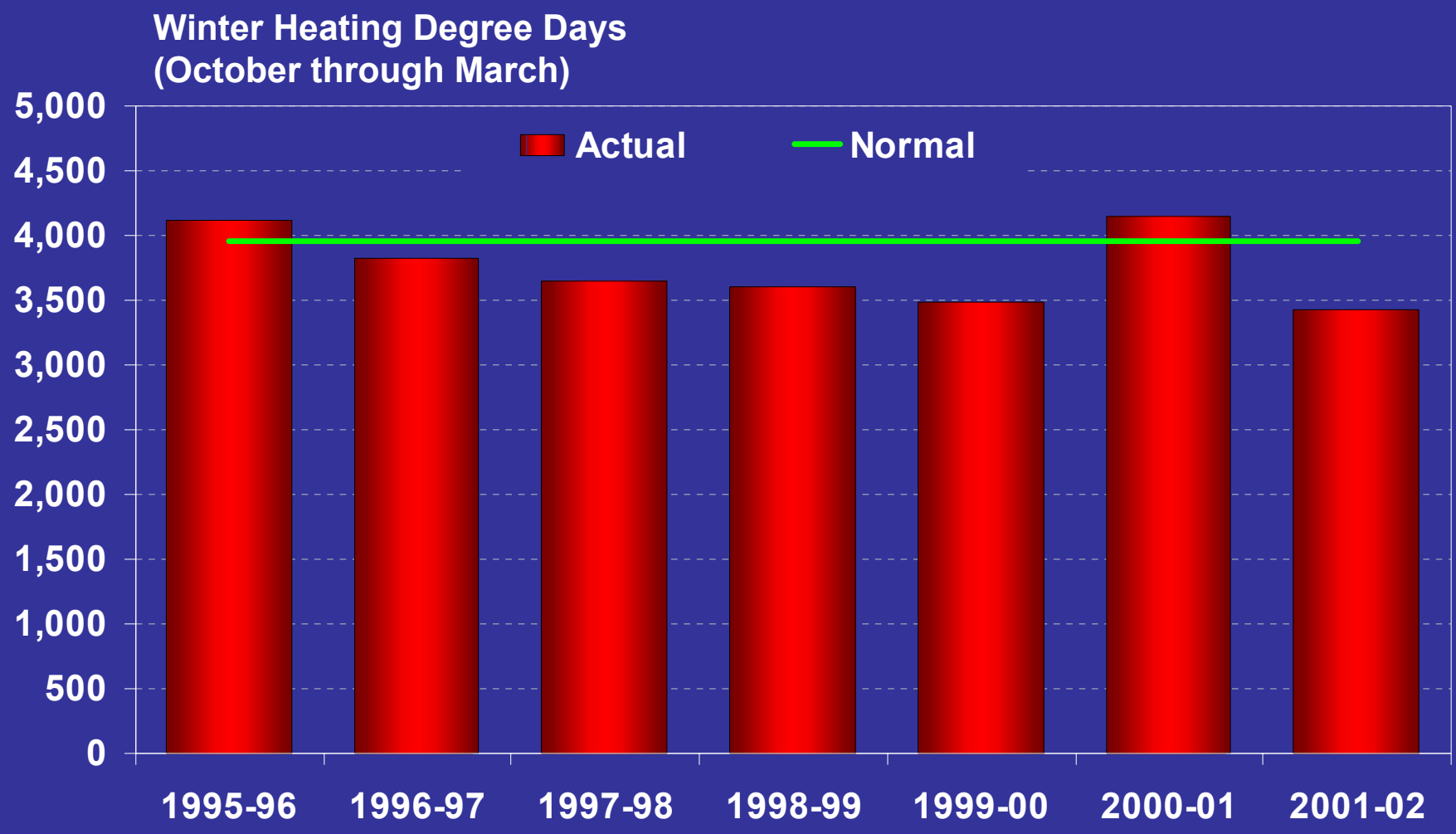
- Market Monitor
- NGL Economics Weekly
- Oil Market Indicators
- FuelFAX

# The Big Picture

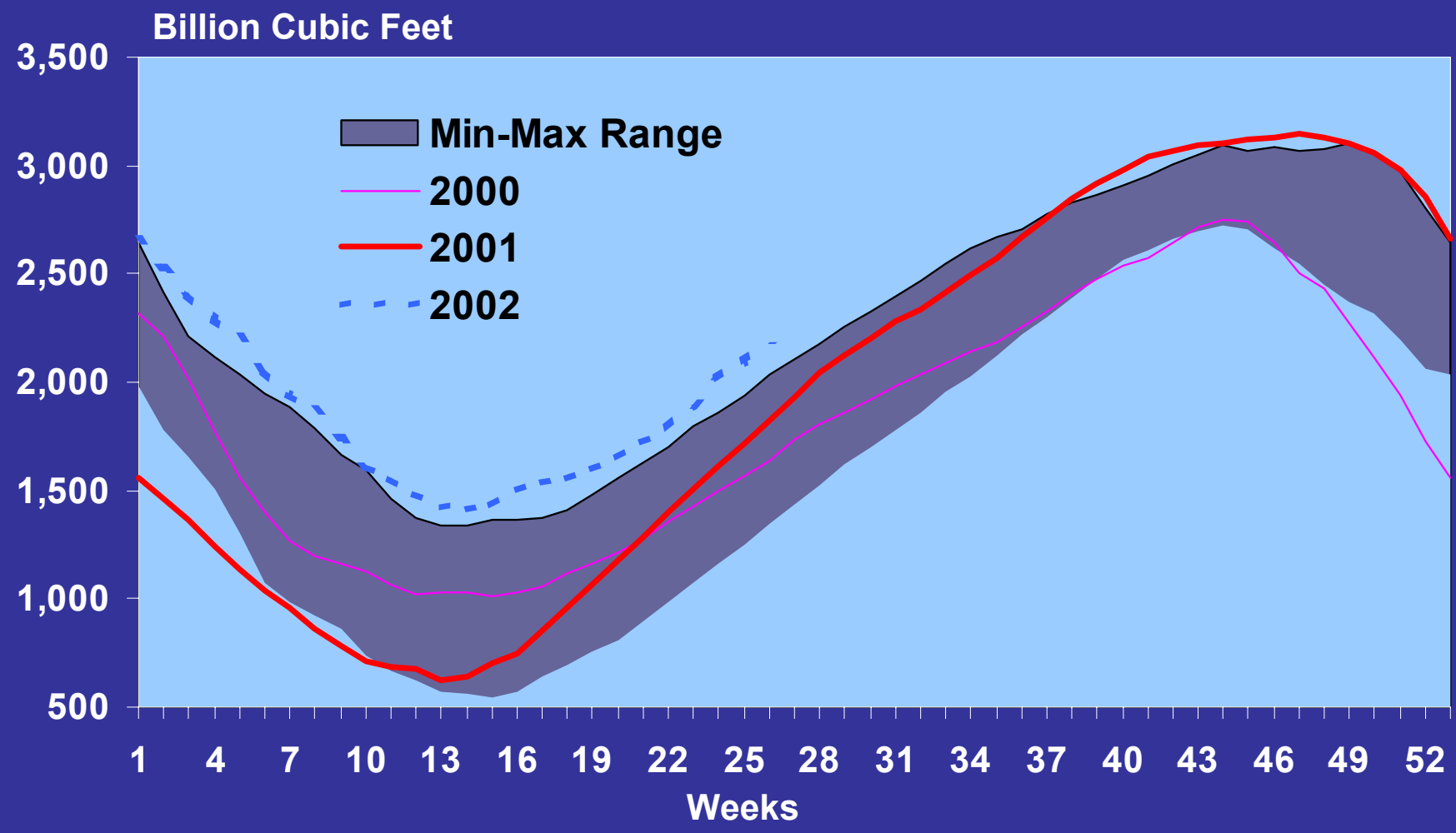
# Natural Gas Prices – Henry Hub



# U.S. Heating Degree Days



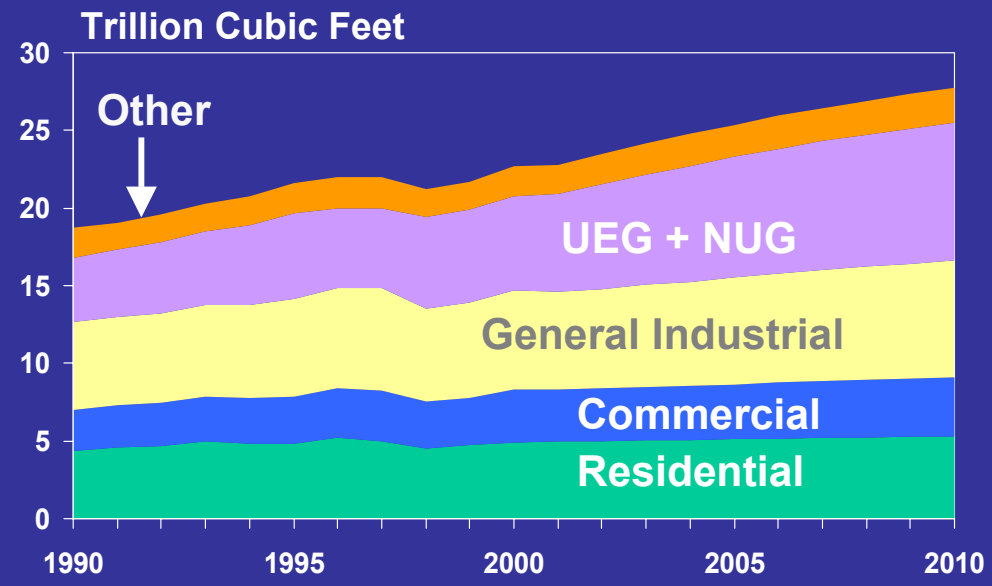
# U.S. Natural Gas Inventory

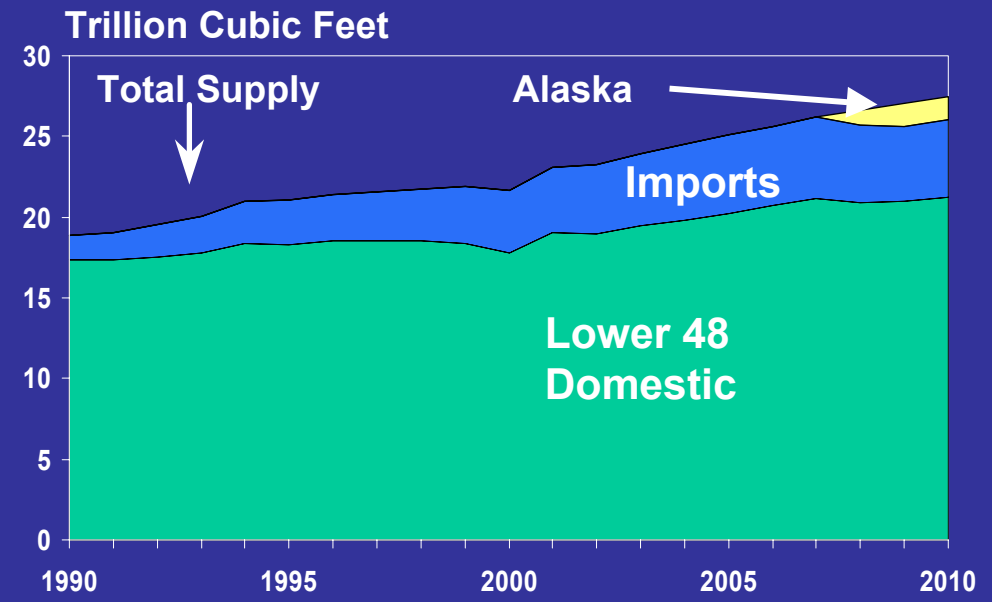


# What Do Recent Events Mean for Long Term ?

- Normally, short term commodity price cycles shouldn't impact the long term outlook
- But, the terrorist attacks may have a lasting effect if government policy is changed to strongly favor security of energy supply
- Mild recession has impact but growth expected in second half 2002. History shows economy always bounces back
- We still believes that our two long term market scenarios are relevant

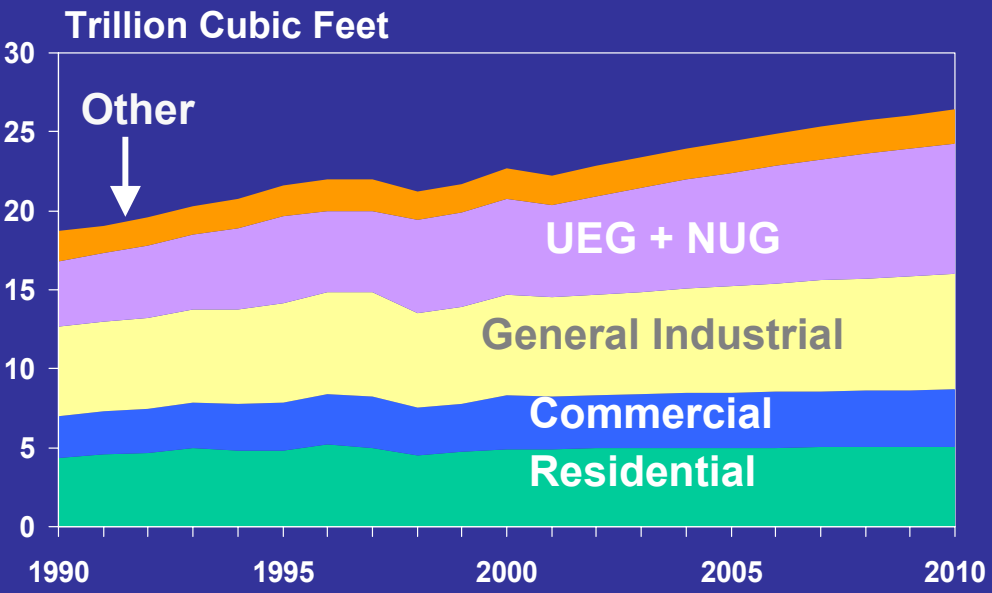
# Balanced Markets Scenario (BMS)

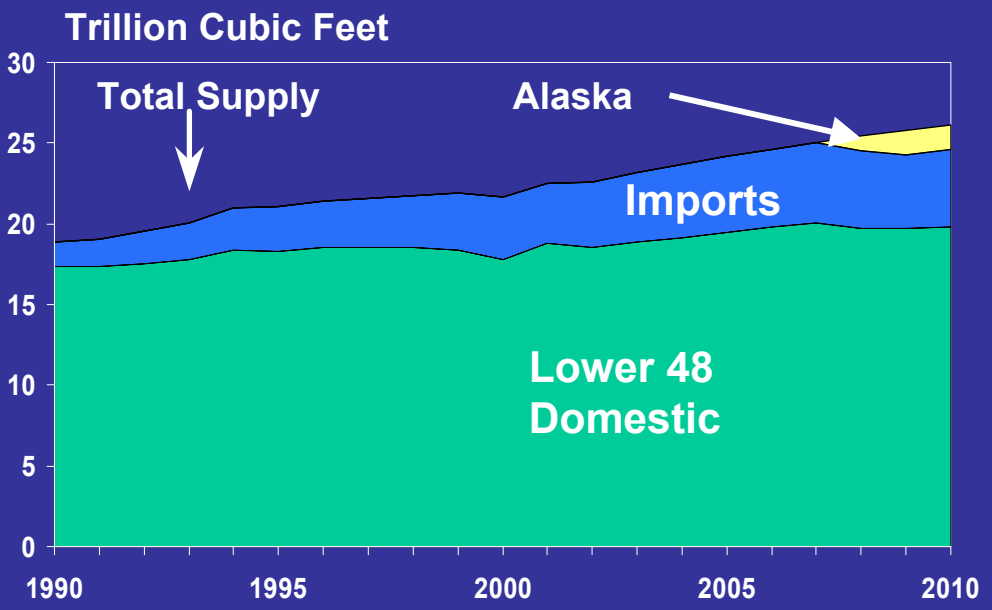



- Annual U.S. gas demand growth rates about 2% (economic growth, electricity sector, competitive pricing)
- A large resource base that can be developed economically
- BMS represents Purvin & Gertz' market outlook

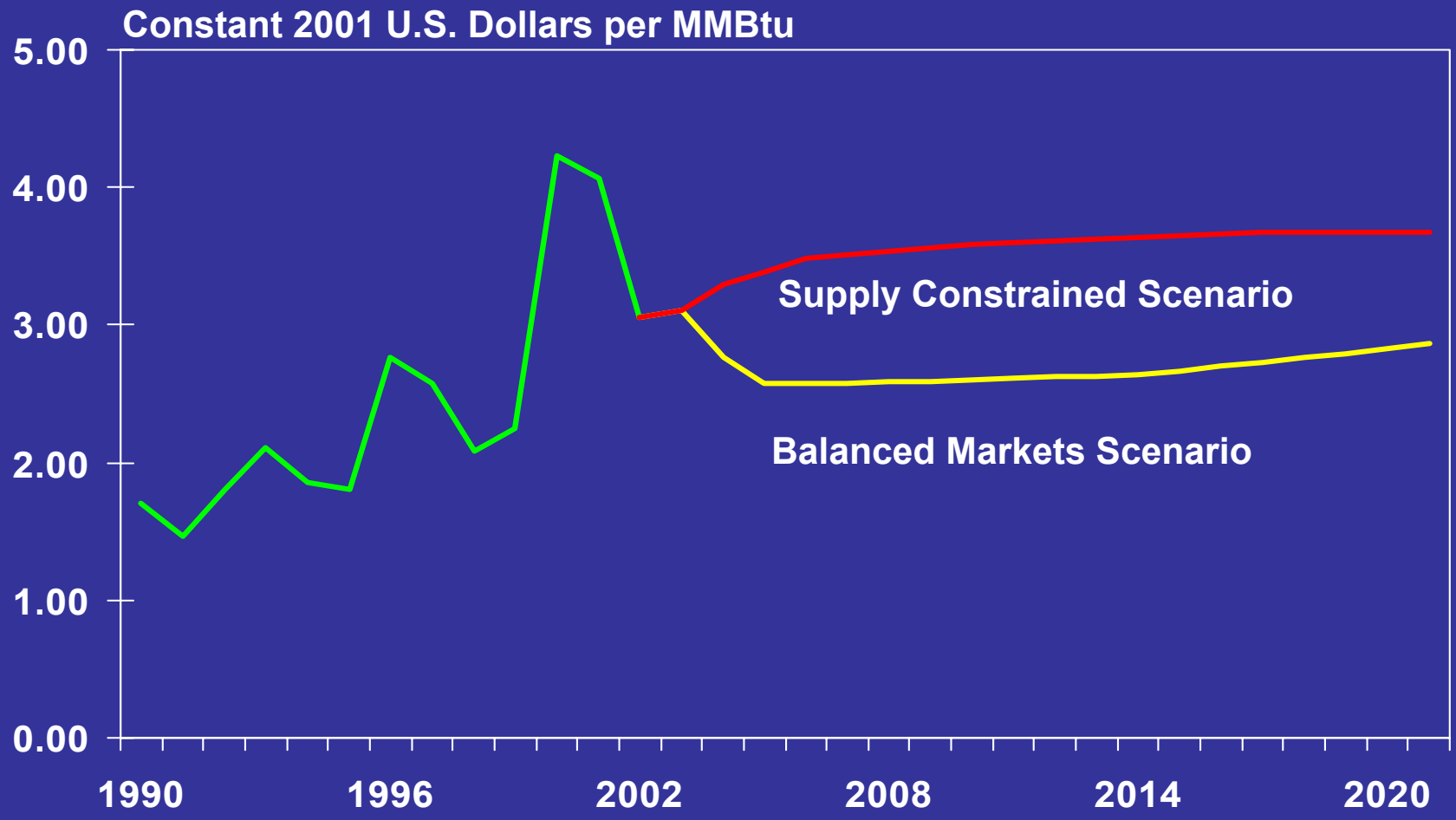
# Supply Constrained Scenario (SCS)




- Conventional gas resource base not as economic to develop
- Need more frontier gas and more LNG
- Demand lower due to higher prices
- This more pessimistic gas supply outlook held by several industry participants

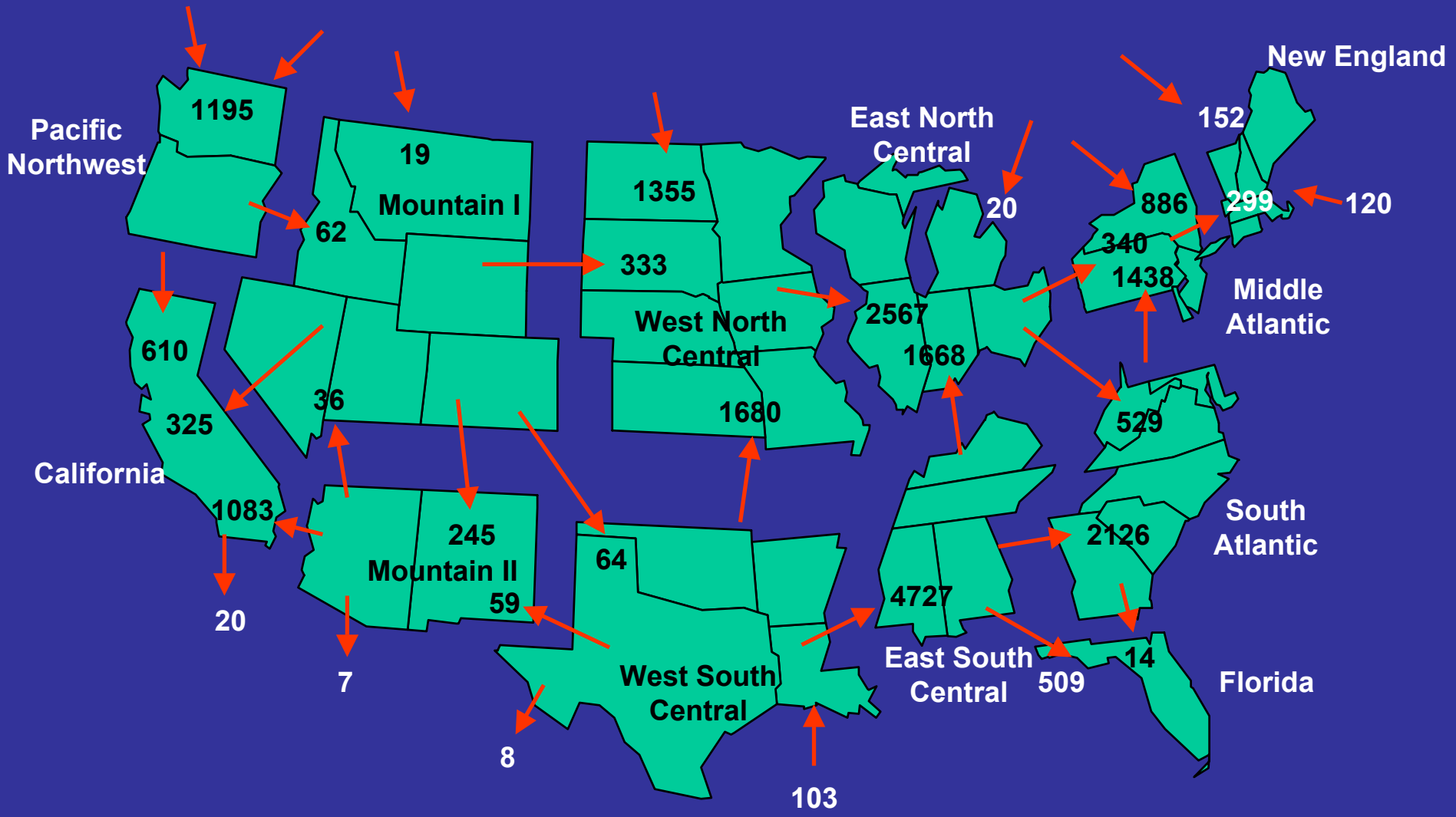
# Henry Hub Price Outlook



# Inter-regional Gas Flows

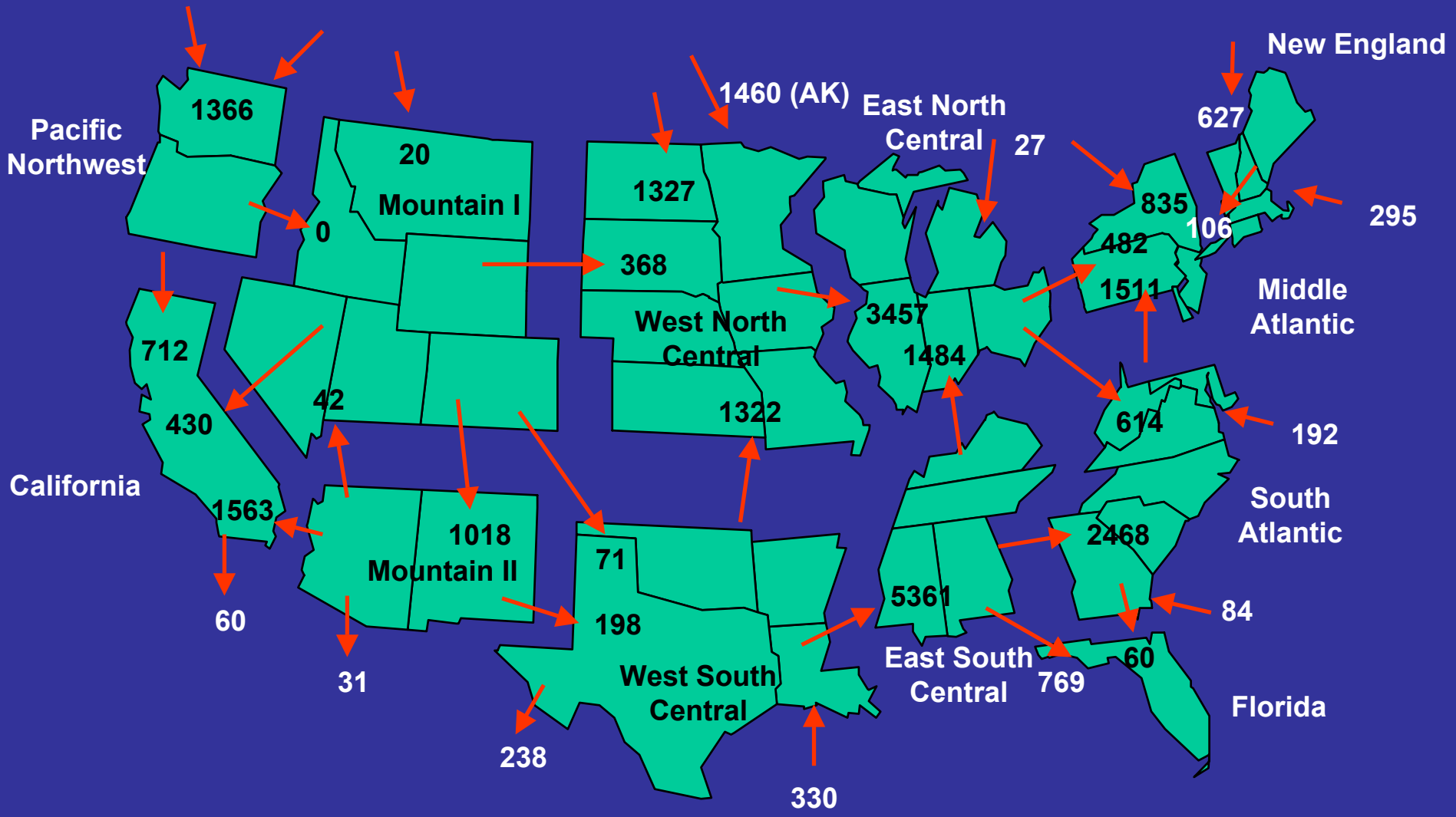
# Lower 48 Natural Gas Flow Patterns: 2000

BCF



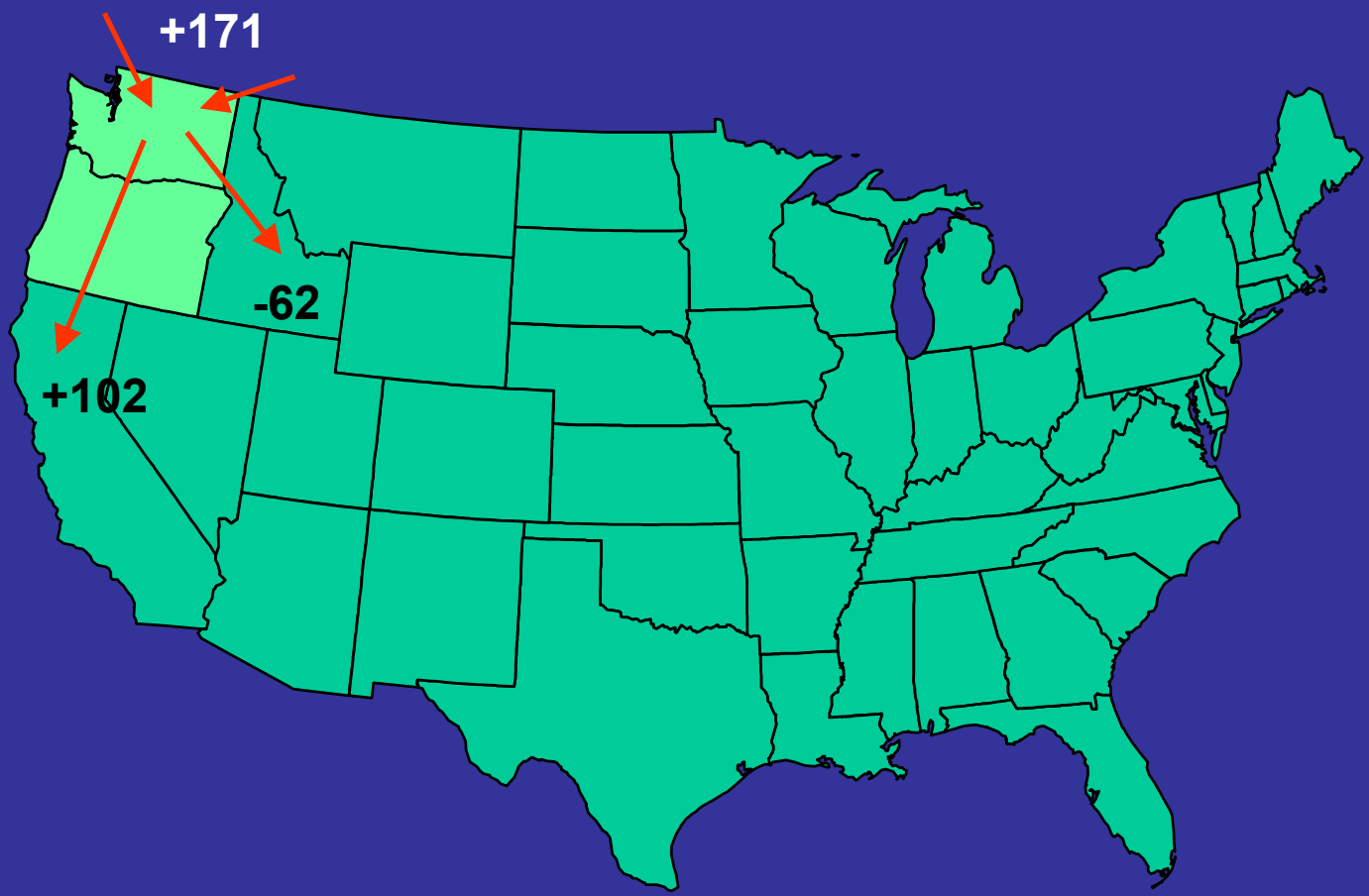
# Lower 48 Natural Gas Flow Patterns: 2010

BCF



# Incremental Pacific Northwest Gas Flows:2000-2010

**BCF**



# Important Big Picture Interregional Gas Flow Changes Expected in the Future...

- Arctic gas flows will reach traditional markets for Western Canadian gas. Alaska starts in 2008 and Mack. Delta starts in 2011. Not only economics but politics drive Arctic gas.
- Increasing Western Canadian gas flows to U.S. Midwest reduce potential flows from the Gulf Coast to that region.
- Flows of Mountain gas mostly go to the California market either directly or through West South Central; points further east are also reached mostly through West South Central.
- Incremental increases in Gulf Coast gas flow to Mexico, supply internal growth, and flow up the Eastern Seaboard.
- Gulf Coast and Western Cdn flows to the U.S. Northeast are impacted by competition from Atlantic Canada.
- Increasing LNG but it remains a niche supply.

# Western North American Supply Forecast

# Long Term Incremental Sources of Supply

## $US/MMBtu (Constant 2001 $) at a Henry Hub Price Equivalent

**Higher Reserve Uncertainty, Higher Transportation Costs, Higher Development Costs, Too Speculative, Too Far, …**


- **Mountain Regions:**
  - Lack of infrastructure threatens to strand gas
- **LNG (varies from <$3.00 to >$4.00):**
  - low/medium reserve uncertainty but high transportation costs
- **Mackenzie Delta gas (close to $3.00):**
  - medium reserve uncertainty but high transportation costs
- **Alaska gas (close to $3.00):**
  - low reserve uncertainty but high transportation costs
- **Other**
  - Scotian Slope & Grand Banks (expensive)
  - Offshore East Coast, CA, BC (out-of-bounds)
  - Mexico (constitution)
  - Hydrates (too speculative)
  - Arctic Islands (too far)
  - Canadian coalbed methane (interesting potential)

# Long Term Incremental Sources of Supply

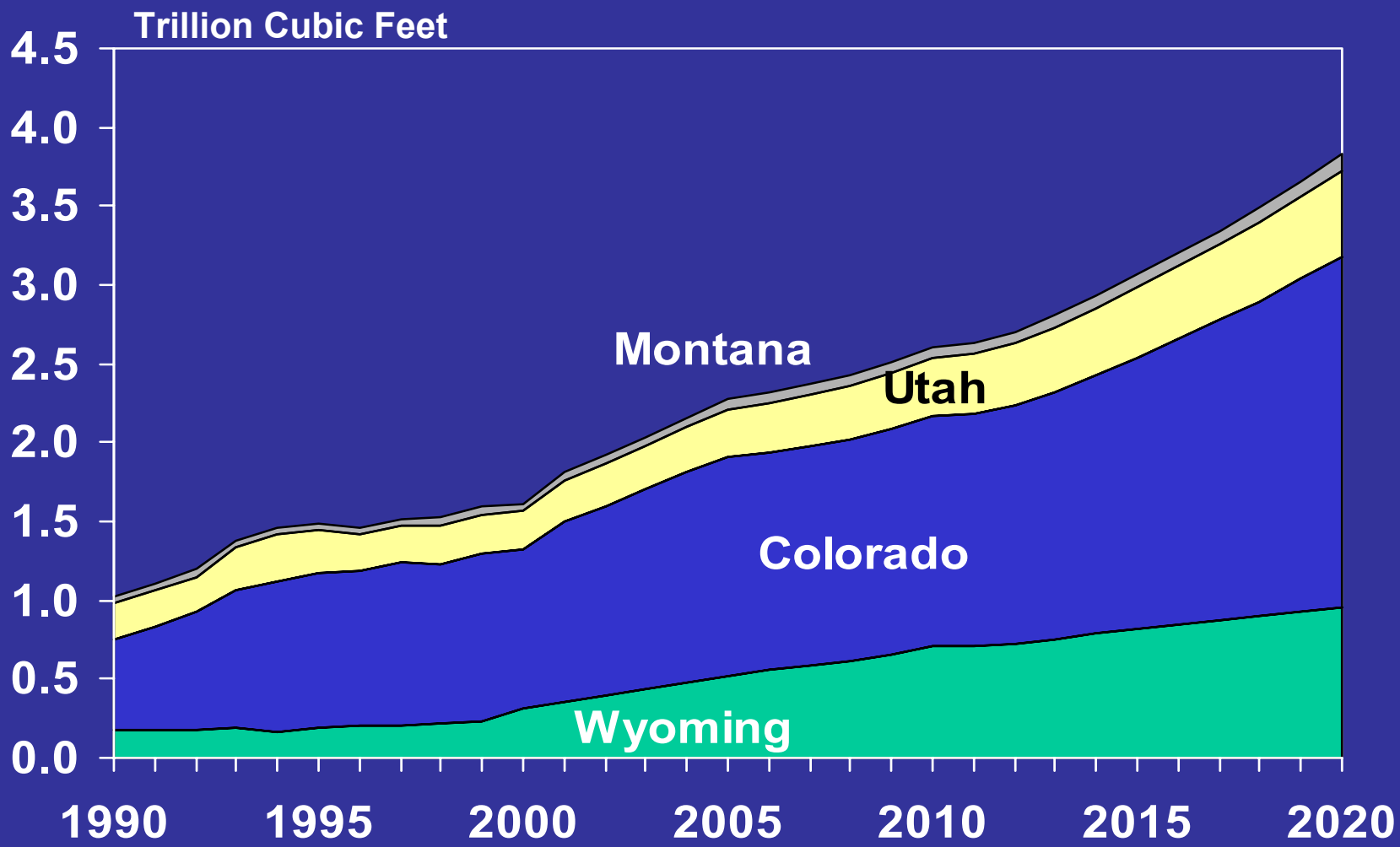
Terra Nova Seacore Team: Offshore Technology

- Deepwater Gulf of Mexico
- Mountain regions (includes coalbed methane)
- Arctic gas
- Offshore Atlantic Canada
- LNG
- Various conventional areas

# Pacific Northwest Region's Outlook Strong...

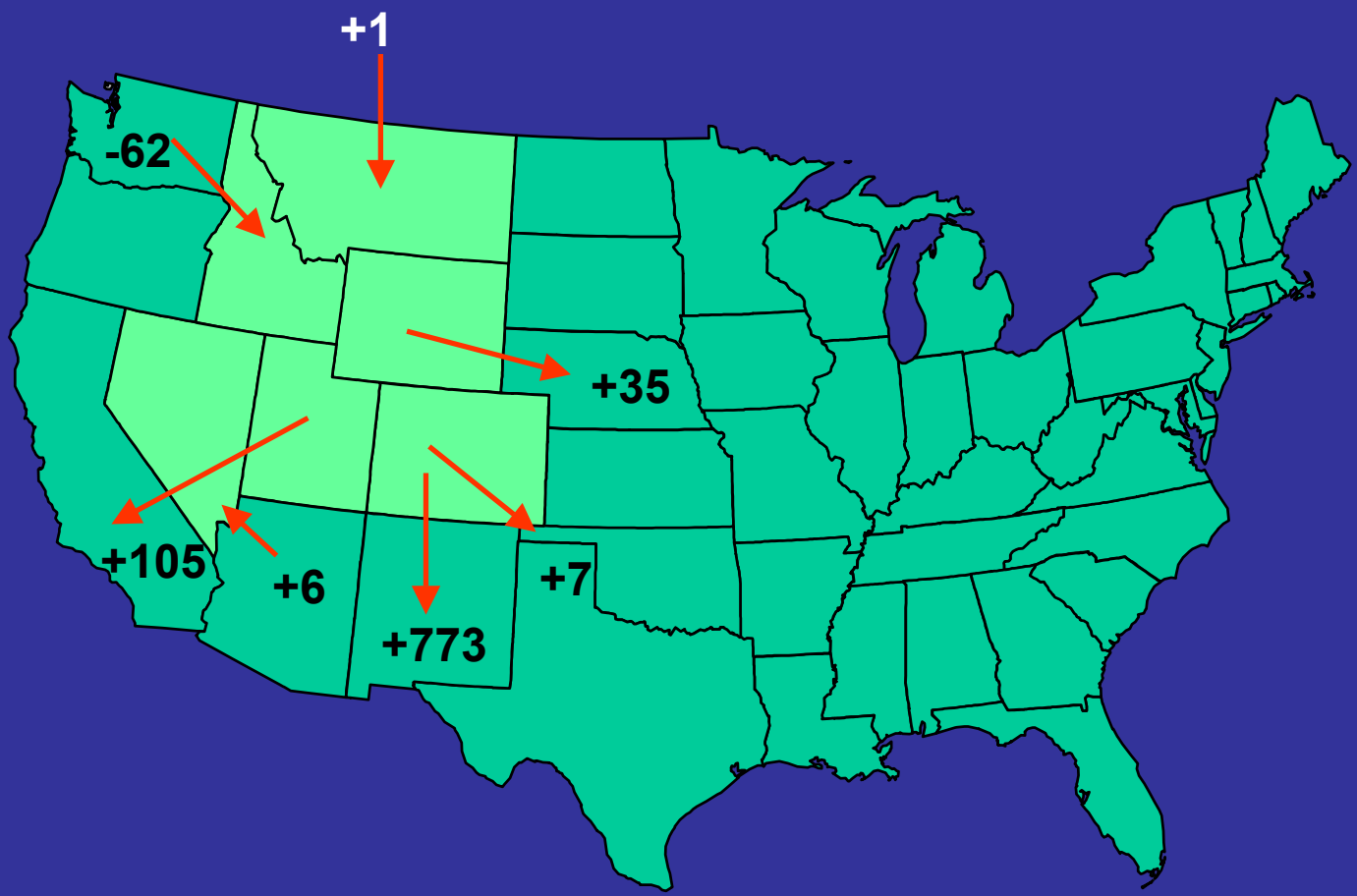
- Production in Pacific Northwest remains insignificant but its demand outlook has considerably strengthened over the last few years; it's the principal corridor for Canadian natural gas to California.
- The Duke and PG&E Gas Transmission-Northwest (formerly PGT) are the principal pipeline systems bringing Canadian gas to the region. Currently, Northwest Pipelines has two large expansion projects approved by FERC and PG&E has recently completed a large expansion (231 MMCF/D) and has two other large projects planned (combined over 500 MMCF/D).
- Imports from Canada continue to grow but at lower growth rates than in the 1990s.
- Most of the transfers out of the Pacific Northwest eventually end up in California.

# Rocky Mountain Conventional Gross Natural Gas Withdrawals

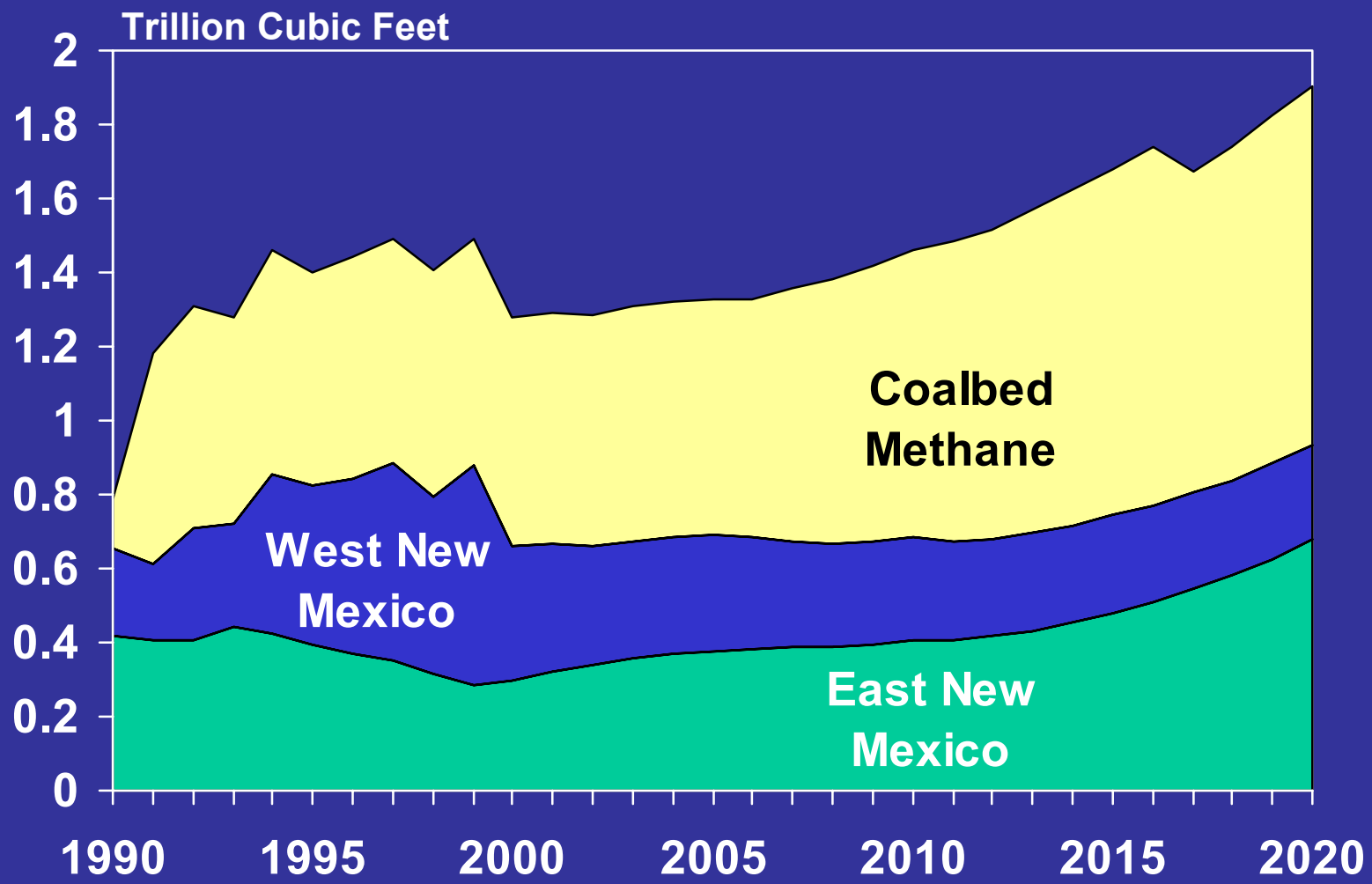


# Incremental Mountain 1 Gas Flows: 2000-2010

**BCF**

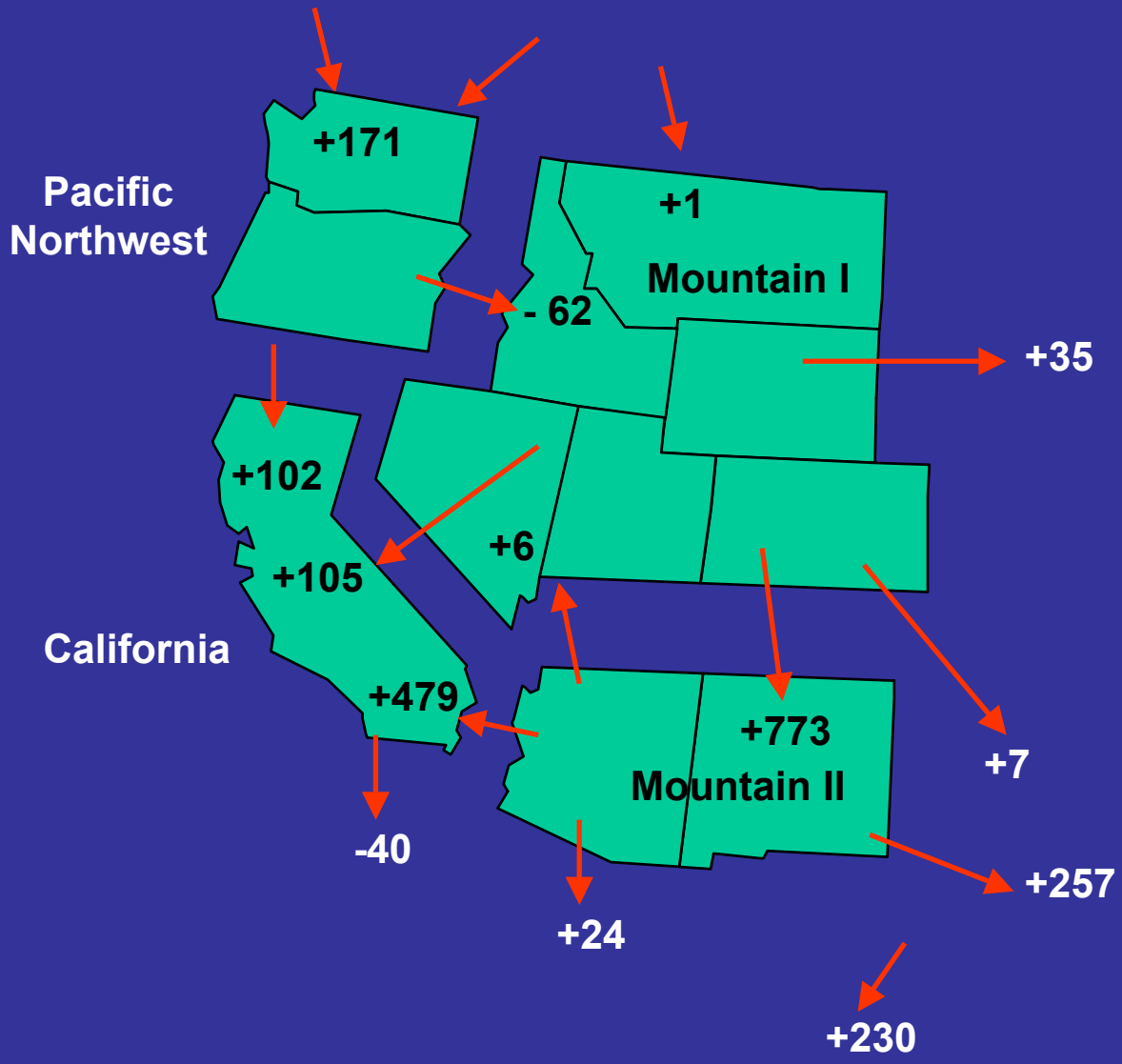


# New Mexico Gross Natural Gas Withdrawals



# Incremental Natural Gas Flows: 2000 – 2010

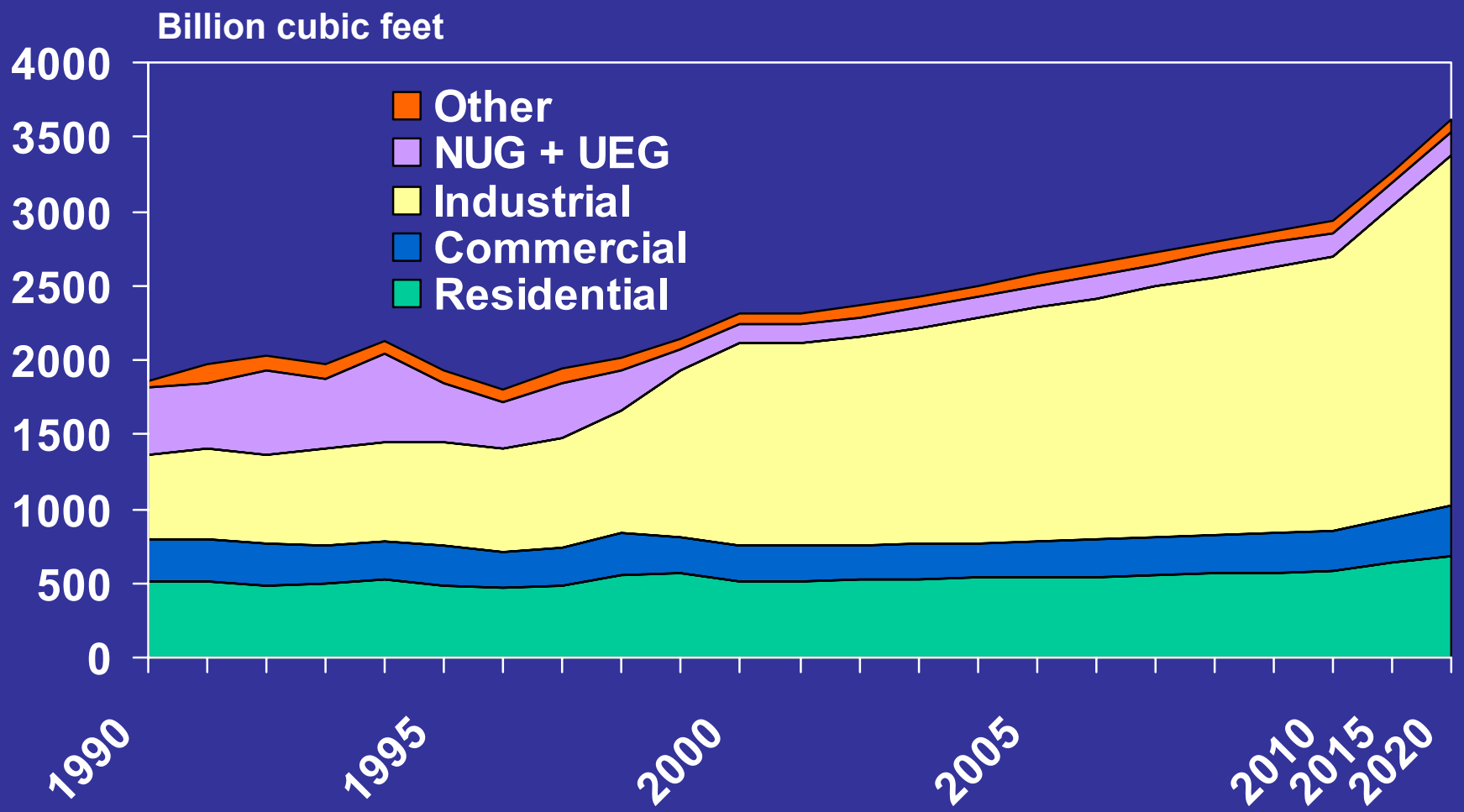
**BCF**



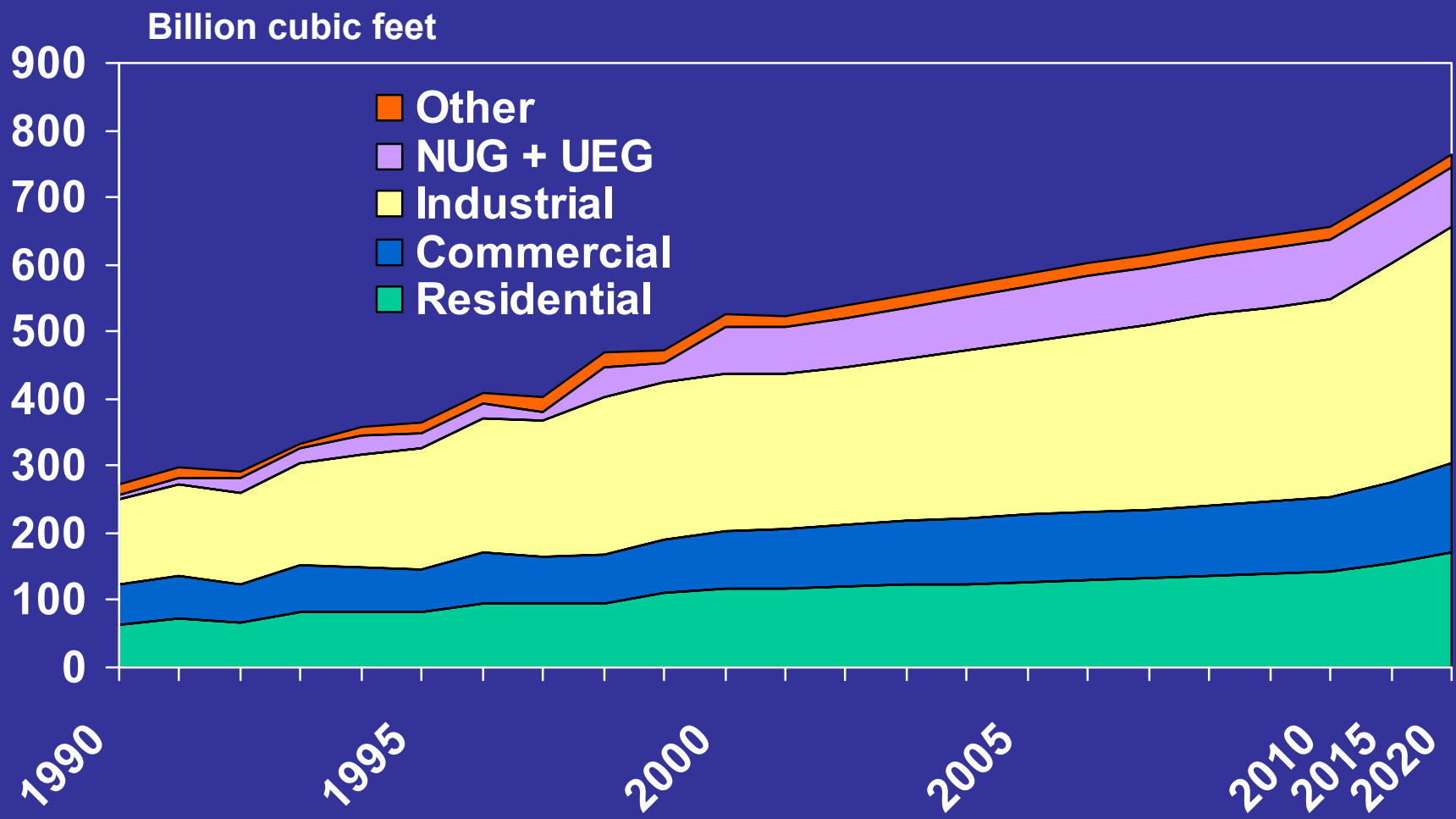
# California's Repeated Bouts with Imbalances...

- Supplies are available from Canada and the Mountain states but inappropriate legislative and regulatory initiatives have lead to repeated imbalances.
- Flows from West South Central through Arizona/New Mexico toward California ceased in the early 1990s.
- California's natural gas demand growth outlook is stronger than historical growth in the 1990s, mostly because of gas-fired electricity generation.
- California gas production in the 300-plus BCF range is not expected to continue to grow due to a difficult business climate.
- Gas imports from Mexico are really reimports of U.S. gas through Baja California.

# California Gas Consumption



# Pacific Northwest Natural Gas Consumption



# Gas Fired Electricity Generation

- Number of announced power projects wildly overestimate requirements
- A reasonable estimate needs to be constrained by economic outlook, trends, efficiency gains, capacity utilization and fuel usage rates
- Despite these constraints, gas is a winner

# Increasing and Changing Canadian Interregional Gas Flows

- Canadian production is increasing in our outlook and new regions become important suppliers, thereby materially changing flow patterns over time.

- The incremental supply is split between domestic consumption and exports to the Lower 48.

- Atlantic gas production will likely experience strong growth with most of the incremental supply moving to the U.S. Northeast, first to New England and then eventually further south to the Middle Atlantic.

- Mackenzie Delta gas starts flowing in 2011; Alaska gas, starting in 2008, is assumed to delay Mackenzie Delta gas since politics dictate the choice of the Alaska Highway route which puts the Arctic basins in a competitive, not synergistic, development scenario. Alaska gas is "invisible" in the Canadian model but there is an impact on Western Canadian production which is consistent with Purvin & Gertz' 2000 study entitled "Alaskan Gas Development Strategies."

# SUMMARY AND CONCLUSIONS

# Summary and Conclusions

- Impressive market growth in the region
- Power plants are key
- Many near term gas pipeline and LNG projects
- Uncertainty w.r.t. infrastructure could modify flow patterns
- Rockies are an important source of new incremental supply
- Both conventional and non conventional gas required

**“Purvin & Gertz is an independent, employee owned, international energy consulting firm providing sound and objective strategic, commercial, and technical advise to the energy sector.”**

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